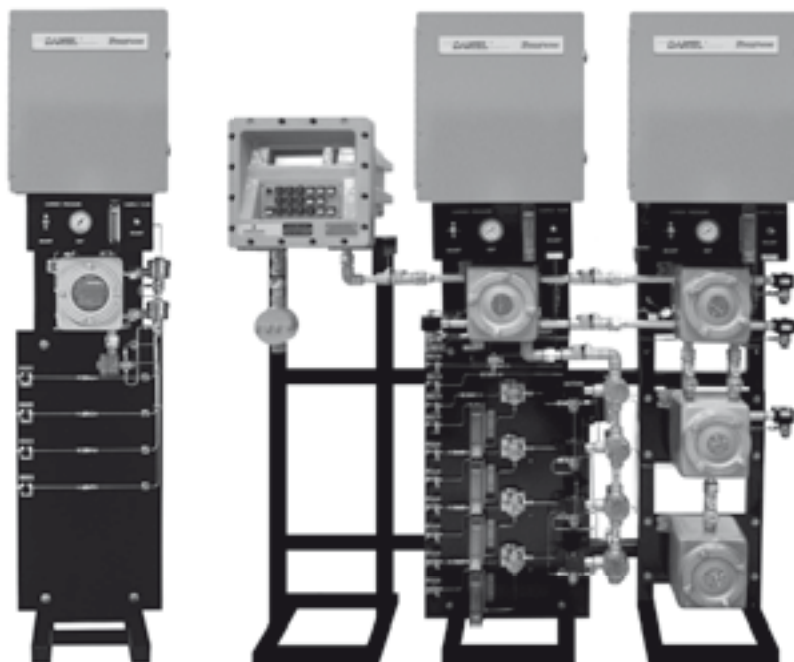


Daniel® Danalyzer™ Model 500 Gas Chromatograph



Daniel® Danalyzer™ Model 500 Gas Chromatograph

Danalyzer™ Model 500 Gas Chromatographs offer the broadest range of analysis options available today in a field-mounted gas chromatograph. Whether it is heating value measurement, trace contaminant monitoring, pipeline integrity, or product quality/process control, the Danalyzer Model 500 is flexible enough to meet your analysis needs. The proven technology and software of the Danalyzer Model 500 series offers superior reliability and precision, lower installation and operating costs, greater application flexibility, and unmatched measurement performance.

Proven solutions for fiscal metering or gas quality measurements

AVAILABLE MODELS

➤ Danalyzer Model 570/571 BTU/CV Gas Chromatograph

- Custody transfer and gas quality analysis
- Compositional analysis of pipeline gas (CH₄ to C₆+, N₂ and CO₂)
- Calculates heating value, relative density, compressibility, Wobbe index and more - all standard
- ± 0.025% CV repeatability over complete temperature range
- ± 0.0125% CV when installed in a temperature controlled environment

➤ Danalyzer Model 590/591 Dual Oven Gas Chromatograph

- Extended compositional analysis of rich pipeline quality gas for better accountability of the heavier components
- Supports a more complete AGA8 calculation
- Dual detectors with 2ppm minimum detectability on a C₉+ peak
- ± 0.05% CV repeatability over complete temperature range
- Optional hydrocarbon dew point calculation software
- Optional C₆+ measurement with H₂S

➤ Danalyzer Model 500 On-Line Gas Chromatograph

- For most trace and % level gas processing, LNG, and pipeline product applications up to 185°F (85°C)
- Isothermal analysis with 1 or 2 micro-thermal conductivity detector/heat-sink ovens
- Liquid and gas analysis in a single unit
- Optional heated sample conditioning oven up to 185°F (85°C)

FEATURES AND BENEFITS

Unmatched measurement performance

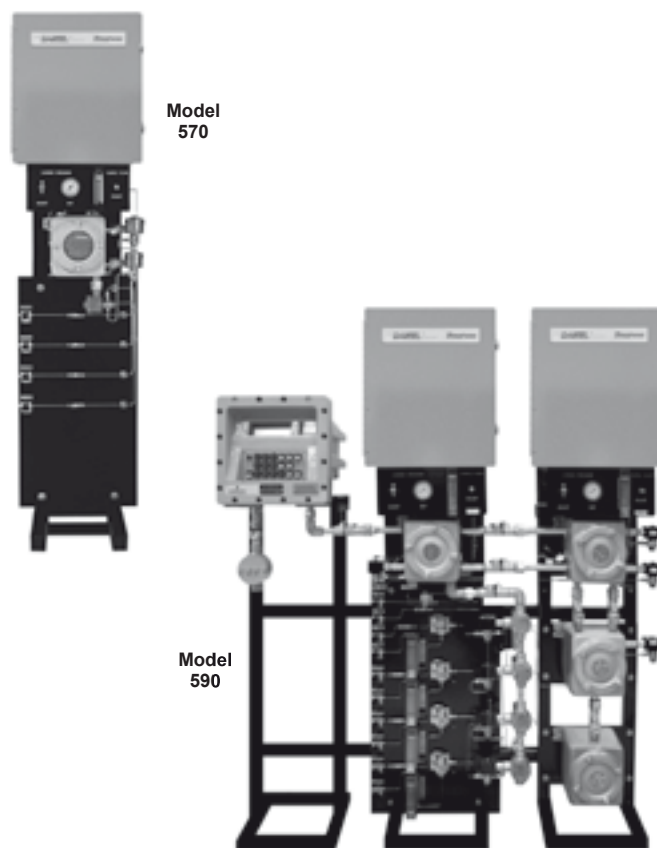
- Highest stated precision (±0.25 BTU/1000 for broad ambient temperature C₆+ analysis)
- Wide dynamic range from percent to trace level components
- Reliable performance over broad ambient temperatures (-18° C to 55° C / 0° F to 131° F)

Lower operation and maintenance costs

- No shelter or instrument air required
- Low helium and power consumption
- Longest chromatograph valve and column warranties available

Easy to use

- Ethernet and Modbus connectivity
- MON2000™ software setup and diagnostics
- Identical setup and operation for all models – no additional training



APPLICATIONS

Standard Natural Gas Applications

We have made our most popular energy and gas quality applications standard. Applications may vary by components of interest, analysis time, reduced hardware (economics), or improved precision. If our standard application solutions don't fit your unique needs, we can customize solutions for many application requirements. Contact your account representative for further information.

Energy Measurement (to C₆+ and C₉+)

The Danalyzer Model 500 series offers applications for energy measurement from C₆+ hydrocarbon ranges to C₉+ hydrocarbon ranges. Calculations based on GPA 2145 or ISO 6976 standards can be provided.

Standard Measurement Ranges

Methane	65 to 100-mole %
Ethane	0 to 20-mole %
Propane	0 to 10-mole %
N-Butane	0 to 5-mole%
Iso-Butane	0 to 5-mole %
N-Pentane	0 to 1 mole %
Iso-Pentane	0 to 1 mole%
Neo-Pentane	0 to 1 mole%
Hexane+	0 to 0.7-mole%
Nitrogen	0 to 20 mole %
Carbon Dioxide	0 to 20 mole%
Hexanes	0 to 1 mole%
Heptanes	0 to 1 mole%
Octanes	0 to 0.5 Mole%
Nonane+	0 to 0.5 mole%

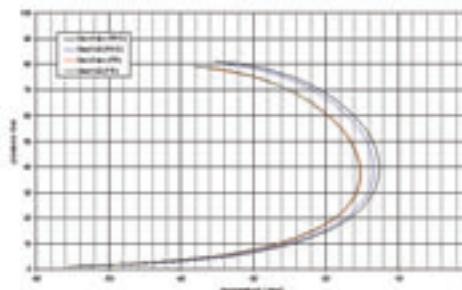
Model 570/571	Model 590/591
C ₆ +	C ₉ +

Gas Quality Analysis

Natural gas contaminants reduce pipeline integrity over time. Most contaminants can be easily measured in the Danalyzer Model 500 for on-line quality assurance. Contaminant monitoring can be combined with energy measurements for complete custody transfer analysis. To the extent possible, these combined applications utilize independent chromatograph valves, detectors and columns, for each primary measurement. This technique offers greater reliability, increased speed, and easier troubleshooting. This approach also makes field upgrades and re-applications in the Danalyzer Model 500 easy, by minimizing internal piping changes.

Hydrocarbon Dew Point Calculation

One optional calculation that is becoming increasingly popular is the calculation of natural gas hydrocarbon dew point. Hydrocarbon dew point analysis is proving to be an important tool for identifying unaccounted for or lost BTU in the pipeline due to condensation.



Calculations of the Hydrocarbon Dew Point are made using PR or RKS equations-of-state and latest physical property data.

Custom Applications

If our standard applications do not fit your needs, the Model 500 can be customized to meet many measurement requirements. Simply submit a completed application data sheet found at the end of this data sheet with your request, or ask our application engineers for assistance.

Standard Danalyzer™ Applications and Repeatability

Application Code	Application Name	Components Measured	Analysis Time	% Repeatability @ Controlled Temperature	% Repeatability Over 0-130°F
570	Standard BTU/CV	C ₁ to C ₆ +, CO ₂ , N ₂	4 min	±0.0125	±0.025
570C7	Standard C ₇ + BTU/CV	C ₁ to C ₇ +, CO ₂ , N ₂	10-12 min	±0.025	±0.05
	Gas Quality (H ₂ S)	Trace H ₂ S (3 - 30 ppm)	90 sec	±2 ppm	±3 ppm
570LF8	Landfill Gas BTU/CV	C ₁ , N ₂ , CO ₂ , O ₂	8 min	±0.1	±0.2
5703	Landfill Gas (mole-sieve)	C ₁ , N ₂ , CO ₂ , O ₂ →	3 min	±0.1	±0.2
570PS	Std C ₆ + with % H ₂ S	C ₁ to C ₆ +, CO ₂ , N ₂ , H ₂ S (%)	10 min	±0.05	±0.1
570OX	Std C ₆ + with % Oxygen	C ₁ to C ₆ +, CO ₂ , N ₂ , O ₂	10 min	±0.05	±0.1
570HH	Std C ₆ + with Helium/Hydrogen	C ₁ to C ₆ +, CO ₂ , N ₂ , He/H ₂	5 min	±0.05	±0.1
590TS	C ₆ + with ppm H ₂ S	C ₁ to C ₆ +, CO ₂ , N ₂ , H ₂ S (ppm)	7 min	±0.0125/±2 ppm	±0.025/±3 ppm
590	Std C ₉ +→	C ₁ to C ₉ +, CO ₂ , N ₂	5 min	±0.025	±0.05
590HC	Std C ₉ + and Hydrocarbon Dewpoint	C ₁ to C ₉ +, CO ₂ , N ₂	5 min	±0.025	±0.05

SUPERIOR PERFORMANCE

The Danalyzer Difference

Airless (Heat Sink) Oven

The heat sink oven in the Danalyzer Model 500 Gas Chromatograph integrates the detector, columns, and analytical valves in a single, temperature-controlled assembly. This unique design enables the analyzer to be mounted in the field without the need for elaborate weather protection or instrument air. To ensure performance to specifications, the majority of our gas chromatographs are tested for repeatability in an environmental chamber prior to shipment, where they are cycled from 0-130°F for 24 hours. Customers are welcome to request testing in our environmental chamber free of charge for every gas chromatograph that is purchased.



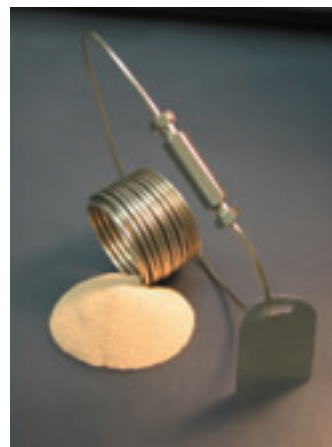
Gas Chromatograph Valves

The Model 500 offers six- and ten-port diaphragm/piston gas chromatograph valves that are the heart of our superior gas chromatograph reliability. These pneumatic valves are guaranteed for the life of the gas chromatograph and specified to operate over five million times between service. By minimizing internal movement (1/1,000 inch) of the pistons, which never come in contact with the sample, abrasive mechanical wear is virtually eliminated. This unique double-diaphragm design removes the need for all springs, o-rings, or lubrication. Valve service is performed by replacing a cost-effective diaphragm set, normally completed in less than 10 minutes.



Micro-packed Columns

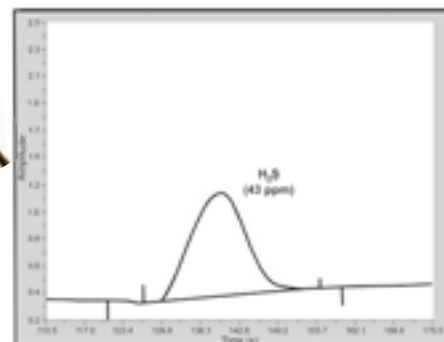
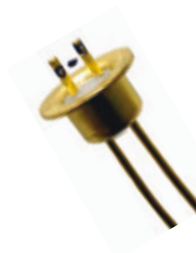
Danalyzer micro-packed columns offer a superior combination of features found in both capillary and conventional packed columns — speed, sharp peak resolution, and low carrier gas consumption. In addition, this unique design provides for greatly extended column life — as well as the longest warranty available on the market (five years on the standard C₆+ natural gas set).



High-sensitivity Thermal Conductivity Detector (TCD)

The TCD thermistor is the detector of choice for most applications due to its universal response to all compounds. The Danalyzer thermistor TCD is able to go well beyond the normal measuring ranges seen in other designs by being able to do many applications with low parts-per-million measurement requirements. This greatly simplifies the gas chromatograph design when a simple and rugged TCD can be used rather than a more complex flame ionization detector (FID).

- TCD detector is sensitive down to 3 ppm
- Dual TCD / TCD configurations available



MODEL 2350A GAS CHROMATOGRAPH CONTROLLER

The controller used with the Danalyzer Model 500 Gas Chromatograph is designed to minimize engineering, training, and measurement accounting. The controller electronics can be remotely mounted in a 19" rack or in the field in an explosion proof NEMA 4X enclosure. The controller offers three to eight independent Modbus serial ports, plus a parallel printer port. Two analog outputs are standard and can be expanded to ten. An optional keyboard display and internal modem is available for local or remote diagnostics (PC). Plug-in transient protection modules meet the highest European standards for electrical protection.

INCREASED OPERATING EFFICIENCIES

- Three to eight field-configurable serial ports support four user-selectable versions of Modbus protocols
- Simplify communication between flow computers, PLCs, DCSs and SCADA systems.
- Optional internal modem and Ethernet communications
- Eliminates the need for strip chart recorders, printers, or PC workstations
- No proprietary network protocols or data highways
- User-friendly laptop/PC software cuts technician time and training costs as much as 50%
- Three levels of security; configurable to read only or read/write for third party access to GC data
- Full Windows® 98, 2000, NT, or XP functionality with MON2000 software
- Includes Modbus polling functions for gas chromatographs, ultrasonic meters, or flow computers
- Internet ready — download MON2000 enhancements directly from our Daniel website and e-mail chromatograms for peer review

MODEL 2350A GAS CHROMATOGRAPH CONTROLLER ADVANCED SOFTWARE

The ability to monitor dual detectors simultaneously opens up new applications with greater speed. Applications such as natural gas extended analysis (C₁ to C₉ in five minutes) or natural gas with helium are all now possible. The primary benefit is faster analysis times for many online applications.

Recorders are not necessary; laptops can be used as the primary interface to allow for almost unlimited chromatogram storage and retrieval. Optional printers can be serial or the less-expensive and easier to install parallel type.



LATEST MEASUREMENT STANDARDS

- The latest GPA 2145 physical properties (energy content and related calculations) are included as standard components to bring users up to date with recent standards
- ISO 6976-1995 applications meet European requirements for energy measurement with full choice of calculation methods
- Manual entry of alternate physical constants allowed (but tagged as "USR" for audit purposes)

Product Datasheet

DAN-PDS-GC-500

May 2010

MON2000™ Software

The Danalyzer Model 500 Gas Chromatograph is designed to operate unattended. If adjustments are needed, our exclusive MON2000 software allows complete control of your gas chromatographs — either locally or remotely. From within MON2000, a user can:

- Review and modify analytical settings on one screen
- Upload and display multiple chromatograms on the screen for comparison
- Upload and trend any of the measured results
- Export data for use in other 3rd party applications
- Overlay multiple chromatograms for troubleshooting and calibration
- Check original calibration against last calibration

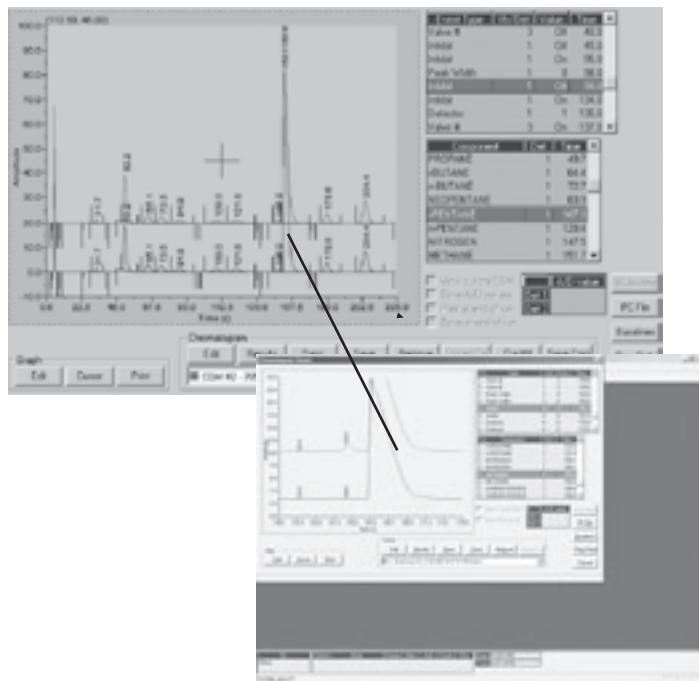
The MON2000 software is Windows®-based software designed to make analyzer configuration, maintenance, and data collection easy. With intuitive drop-down menus and fill-in-the-blank tables, even new users can quickly navigate through the software.

The MON2000 software can display both current and multiple archived chromatograms on the screen streamlining the time needed to perform routine analyzer maintenance.

MON2000 also has a number of tools built in to help users manage their analyzers such as:

- Automatic recording of alarms in a log file
- Event logs that provide a continuous record of all operator changes with time and user name stored
- Maintenance log scratch pad for keeping track of maintenance or testing
- Download and install the latest GPA 2145 and ISO 6976 physical property factors

Data collected from the Danalyzer Model 500 can be stored and displayed in a wide range of options such as trend lines on the screen and logs automatically documenting all changes made to the gas chromatograph. Data can also be exported in formats compatible with most Windows® applications.



Comparing multiple chromatograms and zooming into specific sections is easy with the point and click design of MON2000.

Windows® is a registered trademark of Microsoft Corporation

Powerful Yet Simple – MON2000 Software

Simple drop-down menus

Connect to any GC with a mouse click

Full featured chromatogram display

Manually adjust X/Y scale

Interactive cursor

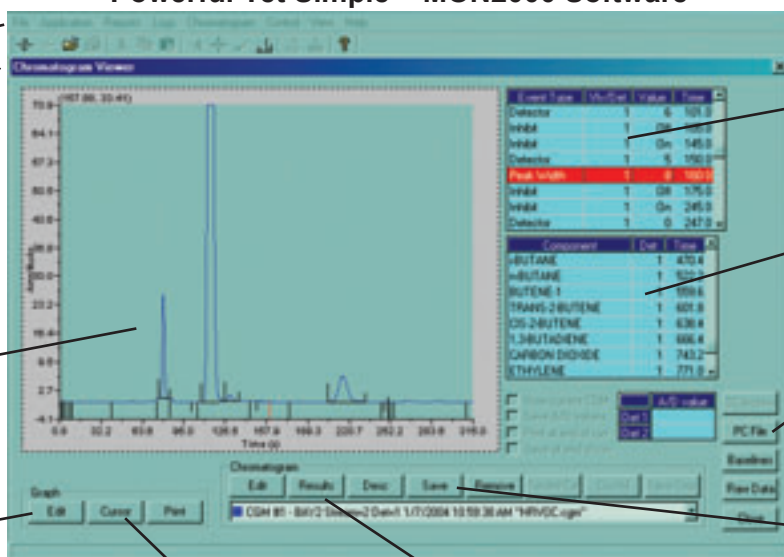
Display results

Summary of application event status and time

Automatic listing of measured components

Quickly add chromatograms to overlay

Save chromatograms to hard drive



Analyzer Networking and Data Communication

Danalyzer Gas Chromatographs can be configured in a number of networking and data communication schemes to meet the communication requirements of the natural gas industry.

Options include modem, Ethernet, and multi-drop RS-485 networks. It is even possible to set up automatic polling for data collection if desired.

Data communication options include simple analog and discrete signals as well as Modbus serial links. To preserve the integrity of the analysis data, all Danalyzer Model 500 Gas Chromatographs are capable of storing up to 35 days of analysis or calibration data in the event of loss of communication.

All Danalyzer Gas Chromatographs are designed to operate unattended. Occasionally, adjustments to the analyzer analytical method or a review of possible alarms may be needed. Using our exclusive MON2000 software loaded on either a PC or laptop running Windows®, you'll have complete control of your gas chromatographs – either locally or remotely.

Networking Flexibility

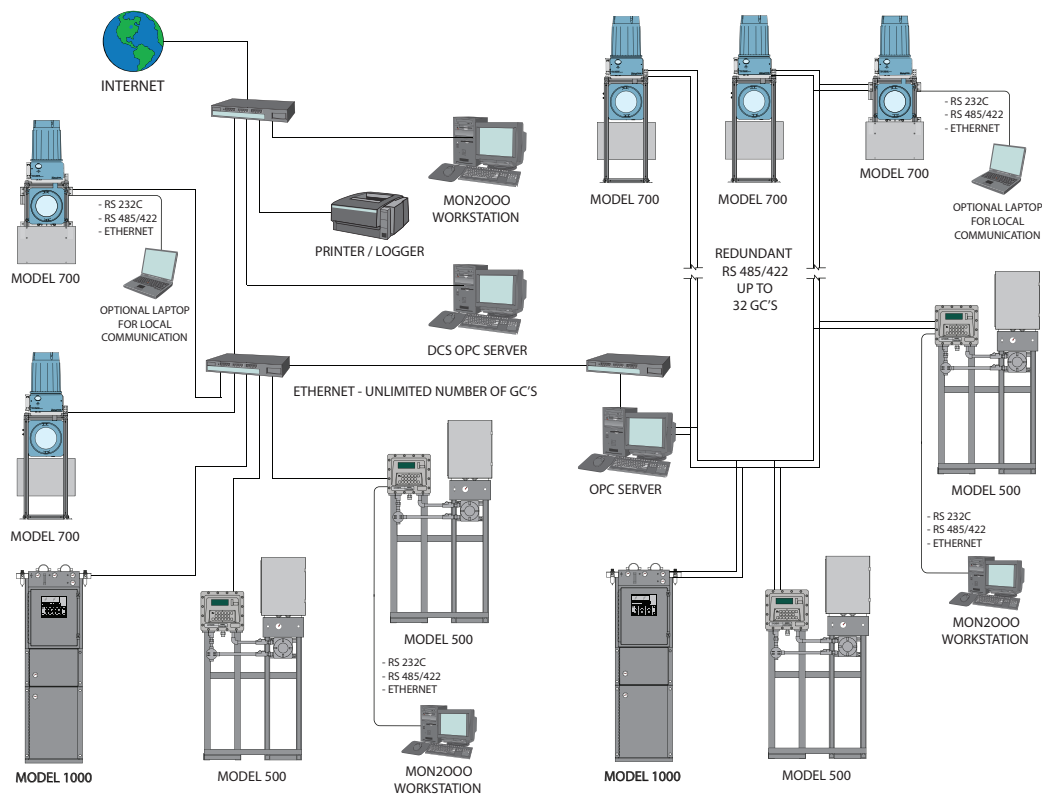
Whether you want to network gas chromatographs throughout the plant or simply link a single gas chromatograph to a flow computer system, the Danalyzer Model 500 can be configured to handle most of the scenarios:

- Choice of Ethernet or RS-485 network
- Can use same network to connect Danalyzer Model 700, Model 500, and Model 1000 Gas Chromatographs
- Able to connect multiple PC workstations using MON2000
- Connectivity to flow computer or SCADA system using industry-standard protocols such as Modbus and OPC

Secure Modbus Connectivity

For online gas chromatographs, Modbus continues to be the preferred choice to connect to a gas chromatograph network. Our Modbus design avoids the use of central interface cards or computers that can act as a single-point of failure in the Modbus link. Instead, the flow computer or SCADA system can “talk” directly to each gas chromatograph to gather the data needed. Furthermore, the register and coil addresses can be easily customized to meet the specific data structure of the flow computer or SCADA system. There is also a program built into the MON2000 workstation to test the Modbus link if troubleshooting is needed.

Simplified Network Communications - Multiple serial ports with Ethernet option can be field configured to provide redundant data highways.



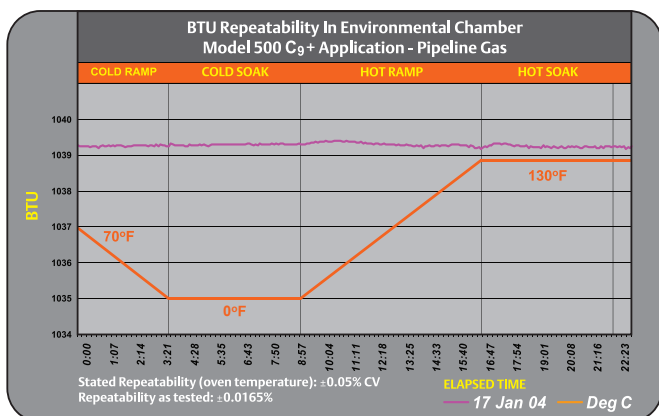
Product Datasheet

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May 2010

Environmental Chamber Testing

We provide the most thorough gas chromatograph testing in the world. We test nearly all Danalyzer Model 500s in our walk-in environmental test chambers prior to shipment. In the environmental chamber, the GC is cycled between 0°F and 130°F for a minimum of 24 hours. This is all part of our commitment to provide analyzers that are capable of providing reliable measurements in the field, without expensive enclosed shelters.



Superior measurement stability in extreme climates is tested for every Danalyzer™ Model 500 Gas Chromatograph before it ships.

Packaging Accessories

We offer standard and custom gas chromatograph packaging accessories to meet your installation requirements.

Gas Chromatograph System Enclosures

- Complete range of gas chromatograph enclosure solutions ranging from simple sun-shields and cabinets to skids, systems and shelters
- API 14.1 compliant solutions with heating of sample lines and calibration gas

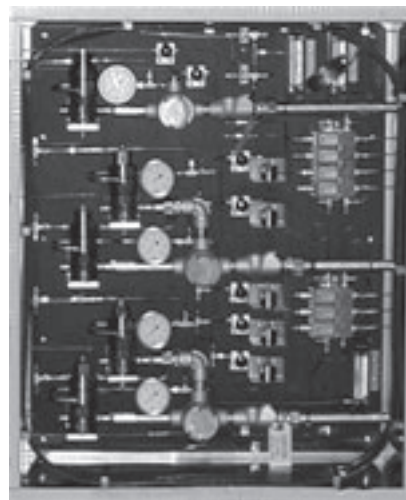
Standard Auxiliary Equipment

- Sample probes / pressure regulators / filters for a wide range of sample handling requirements
- Carrier gas systems with dual manifold regulators for uninterrupted operation
- Calibration gasses and heating blankets

Custom Engineered Sample Systems

Any gas chromatograph is only as good as the quality of the sample it measures. So every sample system for Danalyzer gas chromatographs are custom engineered for the specific requirements of the application. Common features include:

- Heated and open panel designs
- All components rated for the area classification
- Automatic calibration / validation available as an option
- Variety of sample probes to extract a reliable and stable sample



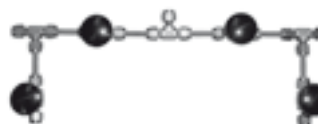
Multi-stream Sample Conditioning System



3 - Sided Shelter



Sample Probe



Carrier Manifold



Calibration Gas with Heating Blanket

Danalyzer™ Model 565, 570, & 590 Gas Chromatographs

Ordering Matrix (must select only 1 option for each column)

- 57X** C6+ (4-minute); Repeatability of +/- 0.5 BTU over ambient temp. range 0-130F.
56X C6+ (12-minute); Repeatability of +/- 1 BTU over ambient temp. range 0-130F.
59X C9+ (5-minute); Repeatability of +/- 0.5 BTU over ambient temp. range 0-130F. *

Code Approvals

- U** US - Designed to meet (NEC) Class 1, Division 1, Groups C&D. (UL) 1203 & NEMA 7 with XP option.
C CSA Certified
A ATEX

Code Power Options

- 1** 115 VAC +/- 15% 50/60 HZ
2 230 VAC +/- 15% 50/60 HZ

Code 2350A Controller Enclosure Options

- R** 19" Rack Mount Version (General Purpose)
E Explosion Proof Version (NEMA 7)

Code Display Options

- NK** No Keypad & Display
KP Keypad & Display

Code Internal Modem and/or Ethernet

- N** No Modem and/or Ethernet
M Internal Modem
E Ethernet
B Internal Modem and Ethernet

Code Analog Outputs

- 02** (2) 4-20mA Non-Isolated Analog Outputs
06 (6) 4-20mA Non-Isolated Analog Outputs
10 (10) 4-20mA Non-Isolated Analog Outputs

Code Communication Ports

- 3** (3) Field Configurable Serial Ports (standard with KYPD)
4 (4) Field Configurable Serial Ports (standard with NO KYPD)
7 (7) Field Configurable Serial Ports with Com4a option (with/without KYPD)

Code Sample Conditioning (Number of sample streams + 1 auto-cal)

- NS** No Stream(s)
1N 1 stream plate
1G 1 stream plate, with Fast Loop/Membrane Filter
2N 2 stream plate
2G 2 stream plate, with Fast Loop/Membrane Filters
3N 3 stream plate
3G 3 stream plate, with Fast Loop/Membrane Filters
4N 4 stream plate
4G 4 stream plate, with Fast Loop/Membrane Filter
5N 5 stream plate
5G 5 stream plate, with Fast Loop/Membrane Filter
6N 6 stream plate
6G 6 stream plate, with Fast Loop/Membrane Filter
7N 7 stream plate
7G 7 stream plate, with Fast Loop/Membrane Filter
8N 8 stream plate.
8G 8 stream plate, with Fast Loop/Membrane Filter
9N 9 stream plate
9G 9 stream plate, with Fast Loop/Membrane Filter
XX Specials, Including streams 10-12. (consult factory)

Code Grab Sample

- NG** No Grab Sample
GI Grab Sample Introduce
GT Grab Sample Take
XX Special (consult factory)

Code Application Software

- S** Std. GPA 2172/GPA2145
I ISO 6976:1995
X Special Application

For shipping, Model 570, 565 and 590 Gas Chromatographs require crating and packing to protect their high quality during shipment.

Please indicate which packing specification applies

- 570 & 565 Packing and Crating for Domestic (U.S.) Shipments (per GC)
 590 Packing and Crating for Domestic (U.S.) Shipments (per GC)
 570 & 565 Packing and Crating for Export Shipments (per GC)
 590 Packing and Crating for Export Shipments (per GC)

Other options available:

- Tropicalization (Recommended for salt laden, corrosive environments)
 Tagging, Standard Stainless Steel (each)
 Tagging, Special (per customer specifications) (each)
 Extra 2350A Controller Manual (One included per GC)
 Extra Danalyzer Gas Chromatograph Oper. Manual (One included per GC)

* Users need to ensure the sample remains above the hydrocarbon dew point, and rich gas applications may require sample system heating.
 Heated Sample Conditioning Systems may be ordered separately (consult factory).

Product Datasheet

DAN-PDS-GC-500

May 2010

Application Data Sheet

Every Model 500 Gas Chromatograph is custom built for the specific application requested. To request a free quotation, simply fill out the information below and send it to your world area contact information located on the back of this datasheet.



Name: _____

Title: _____

Company: _____

Address: _____

Phone #: _____

Fax #: _____

Email: _____

Your Reference #: _____

Project Name: _____

Process Unit: _____

Stream Name(s): _____

Hazardous Area Classification: _____

Stream Composition	Units	Stream 1				Stream 2			
		Min	Normal	Max	Measure	Min	Normal	Max	Measure

(For more than two streams, make copies of this page)

Stream Temperature: _____

Stream Pressure: _____

Stream Phase (vapor / liquid) _____

Stream Contaminants: _____

Stream 1

Stream 2

Distance to GC from Sample Point: _____

Mounting: Wall () Pipe () Stand () Controller: Explosion-Proof () 19" Rack-Mount ()

Data Communication: Analog Output () Modbus () OPC () Printer () Modem ()

Analyzer Network: Ethernet () RS-485 Multi-Drop () Power: 110 VAC () 230 VAC ()

Other Options: Carrier Gas () Calibration Gas () Start-Up () Training Class ()
CSA Version () Tropicalization ()

Special Instructions: _____

Product Datasheet

DAN-PDS-GC-500

May 2010

MODEL 500 SPECIFICATIONS

Power: 115 VAC $\pm 15\%$, 220 VAC 15%, 50/60 HZ 100 watts running, 350 watts start-up

Environment: -18° to 55°C (0° to 130°F)

Dimensions (without sample system):

164cm H x 51cm W x 53.5cm D

(64.5" H x 20" W x 21" D)

Mounting: Free-standing (standard)
wall-mount (optional)

Approximate Weight (without sample system):
approx. 36 kg. (79 lbs.)

Area Safety Certification Options (hardware dependant)

Standard: Designed to meet UL Class 1, Div. 1, Groups C, D
(Group B with optional air purge)

Optional CSA NRTL/C Certified: Class I, Div. 1, Groups C, D,
T3B

Optional ATEX Certified: EEx d IIB T4amb = 60°C CE marked
per ATEX Directive (94/9/EC)

Oven: Airless heat sink, maximum 85°C (185°F)

Valves: 6-port and 10-port diaphragm chromatograph valves.
Other types of valves may be used depending on the
application such as liquid injection and rotary valves

Carrier Gas: Application dependent. Typically zero-grade
helium, nitrogen or hydrogen at 90 psig

Detector: Thermal Conductivity Detector (TCD); up to two
depending on application; Flame Photometric Detector
(FPD) available (see FPD Module Data Sheet)

Gating Options: Fixed-Time, Slope and Automatic gating of
peaks

Streams: Up to 12 streams

Chromatograph Control Electronics: Mounted with the gas
chromatograph in explosion-proof housing or remotely in 19"
rack-mounting

Analog Inputs: Four inputs filtered with transient protection
(note that the 4 inputs will be used by the second TCD)

Analog Outputs: Two outputs standard (up to 10 optional), 4
- 20 mA, non-isolated

Serial Communication Ports: Three serial ports standard with
option for a total of eight. Depending on the port, choice of
RS- 232, RS-422 and RS-485 is available as well as the
Modbus protocol

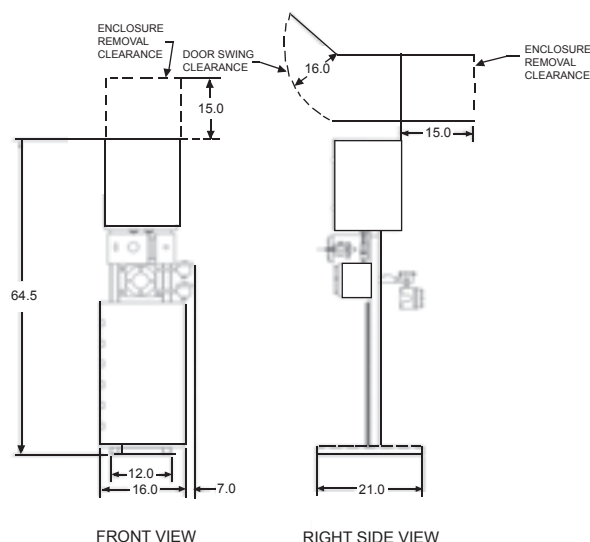
Digital Inputs: One gas chromatograph alarm and five user
assignable inputs, optically isolated with transient protection

Digital Outputs: Five digital outputs can be used for alarms,
optically isolated with transient protection

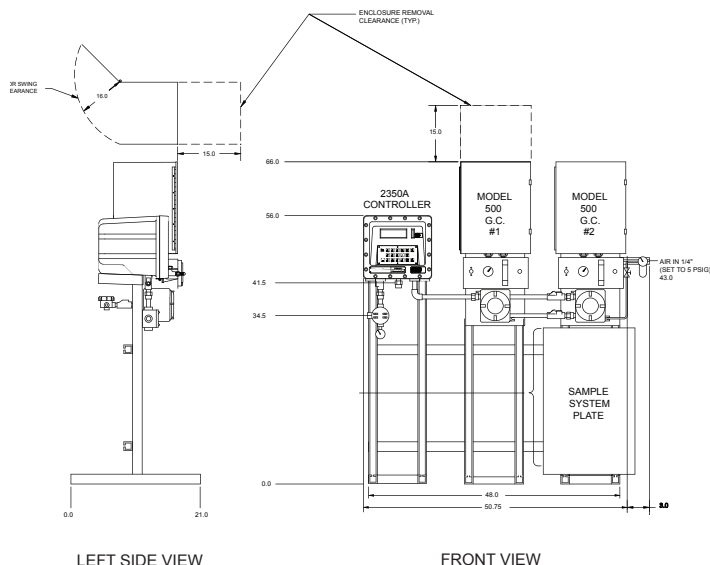
Parallel Printer Port: One parallel port available for printed
reports

Internal Modem (optional): Field-configurable; 300 to 19.2k
baud

Transient Protection: C.E. tested and certified to the highest
levels (3 and 4) of the European IEC 801 STD



Model 500 Single Oven Dimensional Drawing



Model 500 Dual Oven Dimensional Drawing

Product Datasheet

DAN-PDS-GC-500

May 2010

NOTES:

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USA Toll Free 1-866-GC-CENTER
www.daniel.com

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T: 403-279-1879, F: 403-236-1337

Singapore - Asia Pacific,
T: +65-6777-8211, F: +65-6770-8001

Stirling, Scotland - Europe, Mid-East, Africa,
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